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IN TWO SECTIONS

Section I

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Distribution Costs as Factors in Pricing Policy, by Howard C. Greer 263

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EDITORIAL DEPARTMENT NOTE

With the enactment of the Robinson-Patman Act, cost accountants were faced with the problem of analyzing distribution costs in order to assure management that the price differentials being granted did not make more than due allowance for differences in cost of sale or delivery, and to provide a basis for modifying price schedules where more than a due allowance was being given. The decision of the Federal Trade Commission in the Goodyear Case had indicated that it would be difficult to substantiate price differences on the basis of manufacturing cost differentials. Accordingly, attention was focussed on distribution costs and much of a constructive nature has already been done in this field. A technique is gradually emerging, although as in all fields of costing, the methods must necessarily vary considerably from one company to another. As an important contribution to the field of distribution cost analysis we are presenting in this issue of the BULLETIN an article on "Distribution Costs as Factors in Pricing Policy," by Howard C. Greer.

Mr. Greer, as Director of the Department of Accounting and Marketing of the Institute of American Meat Packers, has been interested for a number of years in the problems of distribution costing and has written extensively on this and other accounting subjects. Prior to joining the American Institute of Meat Packers, Mr. Greer spent several years in industrial and public accounting work and served as Chairman of the Department of Accounting and Director of the Bureau of Business Research at Ohio State University. He is a graduate of Northwestern University, a C. P. A. of Illinois and Ohio, and at present, in addition to his duties with the Institute of American Meat Packers, is Professor of Accounting at the University of Chicago.

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DISTRIBUTION COSTS AS FACTORS IN PRICING POLICY

By Howard C. Greer, Director, Department of Accounting and Marketing, Institute of American Meat Packers, Chicago, Ill.

THE Robinson-Patman Act recently has put new emphasis on the importance of distribution costs in the making of sound prices and quantity differentials. This emphasis arises from the clause in the first section of the Act which says that the prohibitions against price discrimination shall not prevent "differentials which make only due allowance for differences in the cost of manufacture, sale, or delivery resulting from the differing methods or quantities in which such commodities are to such purchasers sold and delivered."

How can such differences be determined, and what influence should they have on pricing policies, both as a matter of law and as a matter of good business? This paper presents a few of the techniques which may be employed and touches on some of the policy considerations involved.

Discussion Related to an Assumed Company

To make the discussion specific, it is related to the problem encountered by a company engaged in the distribution of certain staple food products, manufactured in its own plants or purchased from others. The distribution methods employed typify those of distributors in a number of food lines. The figures quoted are illustrative rather than actual, but give a fair idea of the characteristics of the distribution cost problem met by many such companies.

It is assumed that this hypothetical company sells its products to a variety of customers including individual retailers, both small and large, chain stores, jobbers and other large buyers. In the past the prices charged to all of these customers have not been identical. As is the case in many lines of business, the larger buyers commonly have obtained lower prices. How much lower has depended on the circumstances of each individual sale. If there has

been any general policy on price differentials it has been subject to frequent modification as circumstances seemed to require.

This situation finds a counterpart in many lines of business. Manufacturers will usually accept a lower price for a large order than for a small one. The reason is twofold. First, the large order usually is sold at a lower distribution cost; second, the large order increases total volume, results in a wider distribution of goods, enables the distributor to take a more important place in the market, etc. The first circumstance results in a measurable cost saving on large orders; the second involves so many imponderable elements as to defy precise accounting analysis. The Robinson-Patman Act, it may be noted, recognizes the first consideration, but ignores the second.

Information Needed in Determining Pricing Policy

The policy decision of any company ultimately must be made partly in the light of the cost facts and partly with regard to the sales program in general. It seems obvious that the informational background necessary to sound decisions includes at least the answers to the following questions:

(1) What are the average price differentials currently granted to large buyers, and how consistent is the policy with regard to such differentials?

(2) What are the relative costs of serving large and small buyers, and what are the differences in cost "resulting from differing methods or quantities in which such commodities are to such purchasers sold or delivered"?

(3) What practical schedule of price differentials will reflect not more than the provable cost differences on various classes of business?

Having acquired this information a company then can give intelligent consideration to the promotional, competitive, and legal aspects of the pricing problem. Costs are an important factor, but only one factor in this problem.

Few Rules to Guide Cost Accountant

If a cost accountant is asked to develop some information which will furnish the answers to questions (2) and (3) above, what should his procedure be?

There are few rules to guide him. The literature on the subject is not extensive. Reports of the committees which sponsored the Robinson-Patman Act before Congress are suggestive but not highly specific. The Federal Trade Commission, charged with the administration of the Act, has dismissed two complaints in which price differentials were a consideration, but without giving any very definite indication of what it will consider acceptable proof of cost differences.

This situation leaves the accountant wide latitude in his choice of analytical procedures. He has the accepted principles of production cost accounting as a background, but in the matter of distribution costs there are significant differences not merely as between products, but also as between costs for the same product distributed through different channels, to different classes of trade, and in orders of different sizes. The technique adopted must be flexible enough to provide for recognition of all of these factors.

Steps in Cost Analysis

In any cost analysis a sound approach is to determine first what activity is being performed, second what the performance costs, third what unit of measure can be applied in apportioning the cost as between products or customers or orders, fourth what the cost per unit is, and finally how many units of effort or service are required for each operation, product, customer, or order to be costed. In the food company used as an illustration, the accountant needs to know what distribution functions are performed and what element of distribution service results in a higher cost for one group of products or customers or orders than for another. An analysis develops the following facts:

Determining the Functions Performed

The distribution activities of the company are separable into four functions directly related to the cost of selling to different customers through different channels and in orders of different sizes. These functions are (1) order taking, (2) packing, loading, and shipping, (3) delivery, (4) customer record keeping. Other distribution functions might be recognized for certain types of cost analysis (e. g. advertising, as between classes of products), but

these are not of immediate importance for purposes of this particular study.

The company uses four channels of distribution, as follows: (1) sales to individual retailers by street salesmen who call and take orders for subsequent delivery by truck from the company's plant; (2) sales to individual retailers, chain store buyers and others who call at the plant to inspect the available product, which will be ordered there and delivered subsequently by company truck; (3) sales to individual retailers from so-called "peddler trucks," which call at the retail store with a supply of staple products which can be sold and delivered at a single operation; (4) sales to jobbers and other large buyers by telephone or through "house" salesmen for delivery at shipping platform with transportation assumed by the purchaser. Since the circumstances of each of these classes of sales are quite distinct, it is evident that the analysis must show separately the service cost for each class.

Selecting Units for Application of Costs

In making his distribution of expenses by methods of sale the cost accountant will be able to save time if he can determine in advance what unit of distribution service is to be selected for applying the cost to customers, orders, products, etc. The proper selection of this service unit is very important. It must be such that it will lead to a practical distinction between costs for various classes of business, and it must relate to some factor which actually influences the cost incurred. A purely theoretical or arbitrary unit of measure will probably be valueless and misleading.

What causes the expense of selling, shipping, delivery and record-keeping to vary as between orders and customers in a business like that of the company under consideration? No single factor influences all costs in the same way. It therefore is necessary either to select the factor which influences the greatest number of expenses, or the largest expenses, or to use a combination of factors. Both methods will be illustrated briefly.

In this case the two largest items of expense are those of order-taking and delivery. Particularly as to street sales and peddler truck sales, and to a lesser extent in the other channels of distribution, the factor which chiefly governs costs is the number of calls

or stops made by the salesman or delivery truck. Thus the *number of orders* taken becomes a convenient unit for measuring the service requirements of each class of business. Examination indicates that the number of orders is also influential in determining the amount of record-keeping expense and the amount of packing, loading, and shipping expense. Thus the accountant may decide that at least his preliminary analysis will be in terms of the *cost per order* for each of the functions performed.

Analysis of Costs for a Typical Sales Period

The next step is to select for the analysis a typical sales period. Perhaps a single month is a long enough time for the measurement of representative expenses and selling conditions. An analysis form will be prepared to show separately (1) the cost of performing each distribution function, (2) for each channel of distribution employed, (3) divided as between those items of expense which tend to vary with the number of orders taken and those which do not.

Exhibit 1 shows the possible results of an analysis of this type. The principal items of expense are listed for each of the several functions recognized. Those varying with the number of orders are shown under the heading "Direct," and those not so varying are lumped in a single item under the heading "Overhead." Care should be taken to treat as "direct" expenses only those costs which have a provable relationship to the number of calls made, the number of orders handled (equivalent roughly to the number of delivery stops required and the number of invoices prepared). The analysis will be more dependable if made conservatively so as not to impute to the individual order any cost which with equal logic could be treated as varying with the quantity delivered, the type of product sold, or some other factor.

At the bottom of the sheet the accountant may well record any significant information regarding the fruits of the activities of the salesmen in each group. In the example, data are given for the number of men, number of orders, number of items, and total quantity of product sold. The number of orders taken and the size of the average order will be an important factor in determining the relative cost of selling through the various sales channels. The size of the orders placed by each class of customers will have a

ANALYSIS OF DISTRIBUTION EXPENSES BY METHODS OF SALE FOR TYPICAL PERIOD

	Street Sales		House Sales		Peddler Sales		Platform Sales	
	Direct	Ovhd.	Direct	Ovhd.	Direct	Ovhd.	Direct	Ovhd.
Selling								
Salesmen's salaries								
Route men	$2,746	....	$ 218	....	....	....	....	....
House men	....	....	850	....	....	....	$625	....
Salesmen's expense								
Travel	1,013	....	....	....	....	....	....	....
Telephone	177	....	114	....	....	....	83	....
Other selling expense	....	$ 814	....	$372	....	....	....	$334
Total	$3,936	$ 814	$1,182	$372	....	....	$708	$334
Packing and Loading								
Labor—picking, weighing, marking	$1,315	....	$ 419	....	....	$201	....	$247
Shipping containers	235	....	67	....	....	31	....	....
Dock expense	....	$ 319	....	$143	....	52	....	131
Total	$1,550	$ 319	$ 486	$143	....	$284	....	$378
Delivery								
Drivers' wages	$1,831	....	$ 570	....	$1,860	....	....	....
Truck expense	1,193	....	351	....	815	....	....	....
Garage expense	....	$ 617	....	$291	....	$104	....	....
Total	$3,024	$ 617	$ 921	$291	$2,675	$104	....	....
Records								
Labor—billing	$ 428	....	$ 136	....	$ 123	....	$ 50	....
Labor—posting	182	....	56	....	58	....	12	....
Forms, postage	85	....	27	....	30	....	6	....
Office Expense	....	$ 141	....	$ 45	....	$ 34	....	$ 14
Total	$ 695	$ 141	$ 219	$ 45	$ 211	$ 34	$ 68	$ 14
Total Distribution Expense	$9,205	$1,891	$2,808	$851	$2,886	$422	$776	$726
Order Data								
No. of Salesmen	22		5		10		2	
Orders per Man		447		702		781		233
Total No. Orders	9,834		3,509		7,812		466	
Items per Order		2.8		2.1		1.2		8.2
Total No. Items	27,551		7,371		9,371		3,820	
Weight per Order		114lb		147lb		21lb		1,014lb
Total No. Cwt.	11,212		5,162		1,651		4,737	

EXHIBIT 1

determining influence on the distribution cost for that customer class.

It will be noted that street sales and house sales require the performance of all four of the distribution functions mentioned at the outset. In the case of peddler truck sales the selling and delivery function are combined, and the expense is listed in the analysis under the heading of "Delivery." In connection with this method of distribution it will be noted also that the entire amount of packing and loading expense is treated as an overhead rather than as a direct item; this is because the entire truck is loaded with a bulk supply of product without reference to any specific orders; the orders develop as the salesman proceeds on his way from store to store, and will be filled as required at the time. Platform sales also are treated as involving no packing and loading expense which is identifiable as varying with the number of orders; the principal distinguishing characteristic of this class of trade, however, is the absence of any delivery expense.

Unit Cost Per Order and Per Hundredweight

Exhibit 2 contains the information from Exhibit 1 reduced to a

COSTS PER ORDER AND PER CWT. FOR VARIOUS METHODS OF SALE

Costs	Street Sales		House Sales		Peddler Sales		Platform Sales	
	Per Order	Per Cwt.	Per Order	Per Cwt.	Per Order	Per Cwt.	Per Order	Per Cwt.
Selling	$ .40	....	$ .34	....	....	....	$1.52	....
Packing and Loading	.16	....	.16	....	....	....	....	....
Delivery	.31	....	.31	....	$ .34	....	....	....
Records	.07	....	.07	....	.03	....	.15	....
Total Direct	$ .94	$ .82	$ .88	$ .54	$ .37	$1.75	$1.67	$ .16
Overhead	....	.17	....	.17	....	.26	....	.15
Total Cost	....	$ .99	....	$ .71	....	$2.01	....	$ .31

EXHIBIT 2

"per order" and a "per cwt." basis. It will be noted that street sales and house sales involve approximately the same cost per order, but that the house sales cost per cwt. is lower because of the larger orders taken. Peddler sales have the lowest cost per order and the highest cost per cwt.; this method of distribution is economical as a means of reducing the cost *per stop*, but since the

class of trade visited commonly purchases in very small quantities, the number of stops required to sell a given quantity of product is considerably greater than in the case of street sales, and the cost *per cwt.* is higher in proportion. Platform sales, on the other hand, have the highest cost per order and the lowest cost per cwt.; this class of business perhaps is handled by a more experienced and better paid salesman, who spends a longer than average time with each customer, but who obtains an average order nearly ten times as great as that taken by the typical street salesman.

The so-called "overhead" expense, figured on a per cwt. basis, is the sum of these costs in connection with each function which are not chargeable to the number of orders taken. The average overhead per cwt. figures out about the same for three of the four channels of distribution; for peddler trucks it is somewhat higher because it includes the cost of packing and loading the trucks and certain supervisory and auditing expense not present in connection with the other methods of distribution.

Unit Costs by Order Sizes—First Method

Arrived at this point the accountant next proceeds to determine the relative cost of selling orders of different sizes. This involves a separate analysis for each trade channel employed. Exhibit 3 shows how an analysis for the "Street Sales" division may appear.

DIFFERENCES IN COSTS FOR STREET SALES ORDERS IN VARIOUS SIZE GROUPS

(all direct costs apportioned on per order basis)

Order Group	Total Wt. Sold	No. of Orders	Wt. per Order	Direct Cost per Order	Direct Cost per Cwt.	Ovhd. Cost per Cwt.	Total Cost per Cwt.
Under 25 lb	385	2,396	16	$ .94	$5.87	$ .17	$6.04
25-50 lb	1,035	2,882	36	.94	2.61	.17	2.78
50-200 lb	3,383	3,257	104	.94	.90	.17	1.07
200-500 lb	2,977	945	315	.94	.30	.17	.47
500-1,000 lb	2,067	273	757	.94	.12	.17	.29
Over 1,000 lb	1,365	81	1,685	.94	.06	.17	.23
All orders	11,212	9,834	114	.94	.82	.17	.99

EXHIBIT 3

In the period under review it is assumed that street salesmen took 9,834 orders for a total of 11,212 cwt. of product, an average of 114 pounds per order. A study of the orders reveals that they vary greatly in size. Nearly one-fourth of them called for less

than 25 pounds of product; a few were for more than 1,000 pounds of product. The numerous small orders—each requiring a salesman's call, a truck delivery, packing, loading and shipping operation, and considerable record-keeping—contributed only a small fraction of the total amount of business. For example, the group of orders of less than 25 pounds in weight were 25 per cent of all orders, but produced only 3 per cent of total volume; the entire group of orders of less than 50 pounds were about 55 per cent of all orders, but provided only 12½ per cent of all volume, etc.

If the cost of taking and delivering each order were the same, the result would be a very high cost per cwt. for the small orders and a relatively low cost for the large ones. Computed on this basis, the distribution costs in Exhibit 3 for the group of orders of less than 25 pounds figure out as a little over 6 cents per pound, while for the orders of over 1,000 pounds they were not quite ¼ cent per pound. Plainly a substantial difference in prices as between very large and very small orders could be "justified" on the basis of differences in cost. Whether such a difference is justifiable from an economic or competitive standpoint is another matter.

It should be remembered that there is no requirement in the Robinson-Patman Act that prices for orders of various sizes must differ by the amount of the differences in cost. In one of the committee reports on the bill its sponsors explain: "It (the Act) does not require the differential, if granted, to be the arithmetical equivalent of the difference (in cost). It is sufficient that it does not exceed it."

This may be interpreted to mean that if, in the illustrative case covered by Exhibit 3, customers are granted lower prices on orders of between 25 and 50 pounds than for orders of less than 25 pounds, the reduction must not exceed the difference in cost, which is about 3¼ cents per pound. Similarly the next larger group of orders can be sold at a further reduction in price, but this further reduction must not exceed about 1¾ cents per pound. It will be noted that after the 200-500 pound bracket is reached further cost reductions are relatively small. The big savings in cost commonly attributed to very large orders seem, in this instance, to be realized largely as between very small orders and those of medium size.

Two Types of Supplementary Analysis

Of course the consideration of what is sound pricing policy does not end with this preliminary analysis. On its face the calculation indicates that the cost of handling small orders is prohibitive. Quantity differentials designed to reflect such cost differences would be an affront to many customers. What should be done?

The sales manager of a food company, reading a report of this kind, is likely to challenge it on the ground that it exaggerates these small order costs. He will point out that actually a small order frequently involves less than the average amount of selling time; it may be telephoned in or taken in the house without the necessity for a salesman's call at the customer's store, etc. These contentions may be well founded and certainly deserve careful investigation.

A supplementary analysis for this purpose might be made in one of two ways, either by running time studies on the entire selling and delivery operation, with a view to getting an actual cost on each order handled, or by identifying some additional factor which influences the costs involved in handling orders of various sizes. In either case the process eventually necessitates "averaging" order costs by groups to determine representative experience, since in a typical food distribution business it is not possible to figure a different price on every individual sale according to the circumstances of that particular transaction.

Time Study Analysis—Selling Expense

In the illustrative case it is assumed that a study discloses that the cost of selling is not identical for every *order,* but tends to increase with the number of *items* on an order. That is to say, selling time and the related expense are governed partly by the number of orders taken and partly by the number of items ordered. It takes the salesman a certain average time to get to the customer's place of business; the cost of this time varies with the the number of orders, regardless of their size. After the salesman has made contact with the customer, however, the amount of time spent in selling tends to vary with the number of items sold.

To reflect this situation in the cost calculation an analysis similar to that in Exhibit 4 may be prepared. Here a study has been

ANALYSIS OF STREET SALESMAN'S TIME FOR TYPICAL WEEK

Day	Productive Time: Route Travel	Route Selling	House Selling	Total Prod.	Non-Prod. Time	Total Time
Monday	348	117	85	550	60	610
Tuesday	111	64	113	288	66	354
Wednesday	222	84	156	462	..	462
Thursday	157	77	105	339	75	414
Friday	436	132	...	568	..	568
Saturday	...	...	...	...	195	195
Week	1,274	474	459	2,207	396	2,603

Expense					Orders	Items
Salary	$19.04	$7.09	$6.87	$33.00	R—101	288
Auto expense	12.00	....	....	12.00	H— 44	93
Phone expense	1.70	....	.70	2.40	.....	...
Total	$32.74	$7.09	$7.57	$47.40	T—145	381

Unit Cost			
Per Order	$ .33	....	....
Per Item	....	$ .025	$ .08

EXHIBIT 4

made of the way in which a typical salesman spent his time during a given week. The columns show the number of minutes spent in travel on the route, in selling on the route, in selling in the house, and in non-productive activities (that is, work not directly connected with taking orders). Route travel time is considered as varying with the number of productive sales calls made; route selling time is treated as varying with the number of items ordered and house selling time in the same way. Sales salary expense is divided according to the time spent; automobile expense is treated as applying solely to route traveling; telephone expense is divided according to the expense incurred in telephoning orders in from customers' stores and in telephoning to customers from the house.

As a result of this analysis the tentative findings shown in Exhibit 2 now may be modified as follows: Instead of saying that the average order taken by a street salesman costs 40 cents to sell, the cost accountant now says that selling time costs 33 cents per order plus 2½ cents per item (or on house sales a straight 8 cents per item). On this basis a two-item order taken on the route would show a cost of 38 cents, a six-item order 48 cents, etc. A two-item order taken in the house would show a cost of 16 cents, a six-item order 48 cents, etc.

Time Study Analysis—Delivery Expense

Exhibit 5 presents a similar analysis of delivery truck time. Here the travel time is assumed to vary with the number of stops made (which is the same as the number of orders delivered), while the unloading time varies with the number of items. Driver's wages are divided according to the distribution of time; truck expense is figured first at so much per mile, with this in turn converted into a charge of so much per stop. The conclusion is that the delivery costs 19 cents per stop plus 2.8 cents per item delivered (instead of a straight 31 cents per order as shown in Exhibit 2).

ANALYSIS OF DELIVERY TRUCK TIME FOR TYPICAL WEEK

Day	Miles Travel	Travel Time	Unload Time	Total Wt.	No. Orders	No. Items
Monday	46	144	182	3,960 lb	47	144
Tuesday	30	110	101	2,827	21	68
Wednesday	37	126	124	3,358	33	102
Thursday	41	119	135	3,407	34	96
Friday	47	155	210	4,715	51	150
Saturday	46	146	188	4,114	43	142
Week	247	800	940	22,381 lb	229	702
Expense						
Wages	.....	$16.55	$19.45	$36.00		
Truck expense	$24.65	.....	.....	24.65		
Total	$24.65	$16.55	$19.45	$60.65		
Unit Cost						
Per Mile	$ .10	.....	.....			
Per Stop	.11	$ .08	.....			
Per Item	.....	.....	$ .028			

EXHIBIT 5

Unit Costs Under Modified Plan

A similar analysis may be made of packing and loading expense, and customer record expense. The assumed results of these four analyses appear in the two lines making up the center section of Exhibit 6. The average order taken on a street sales route now is figured as costing 61 cents for the order plus 10.2 cents for each item on the order (in place of a straight charge of 94 cents per order as shown by Exhibit 2).

The cost allocation utilizing this information (lower half of Exhibit 6) is merely an elaboration of the figures presented in Ex-

DIFFERENCES IN COSTS FOR ORDERS IN VARIOUS SIZE GROUPS
(costs allocated on per order and per item basis)

Order Group	Total Cwt. Sold	Number of Orders	Weight per Order	Number of Items	Weight per Item
Under 25 lb	385	2,396	16 lb	3,115	12 lb
25-50 lb	1,035	2,882	36	6,052	17
50-200 lb	3,383	3,257	104	10,748	32
200-500 lb	2,977	945	315	4,821	62
500-1,000 lb	2,067	273	757	2,021	102
Over 1,000 lb	1,365	81	1,685	794	172
All orders	11,212	9,834	114 lb	27,551	41 lb

	Selling	Pkg. & Loadg.	Delivery	Records	Total
Per Order Costs	$ .33	$ .05	$ .19	$ .04	$ .61
Per Item Costs	.025	.038	.028	.011	.102

COST ALLOCATION

Order Group	Item Cost per Item	No. Items per Order	Item Cost per Order	Order Cost per Order	Total Direct Cost per Order	No. Orders per Cwt.	Direct Cost per Cwt.	Ovhd. Cost per Cwt.	Total Cost per Cwt.
Under 25 lb	$ .102	1.3	$ .13	$ .61	$ .74	6.25	$4.63	$ .17	$4.80
25-50 lb	.102	2.1	.21	.61	.82	2.78	2.28	.17	2.45
50-200 lb	.102	3.3	.34	.61	.95	.96	.91	.17	1.08
200-500 lb	.102	5.1	.52	.61	1.13	.32	.36	.17	.53
500-1,000 lb	.102	7.4	.75	.61	1.36	.13	.18	.17	.35
Over 1,000 lb	.102	9.8	1.00	.61	1.61	.06	.10	.17	.27
All Orders	.102	2.8	.29	.61	.90	.88	.79	.17	.96

EXHIBIT 6

hibit 3 to include the "cost per item" factor now being recognized. The upper portion of Exhibit 6 presents the order group analysis contained in the first three columns of Exhibit 3, plus an item count and a weight per item calculation. With these facts it is a simple matter to complete the revised cost allocation shown in the lower portion of the exhibit.

Effect of Modified Plan on Unit Costs by Order Sizes

While this new method of cost assignment does reduce somewhat the very high cost charge against orders of less than 50 pounds, it does not greatly affect the charges for the orders of medium and large size. There is a slight flattening of the cost curve and the maximum justifiable price differential is reduced. As to orders of over 50 pounds, however, there is no change in the results which is great enough to be significant from the standpoint of pricing policy.

The two methods of analysis which have been suggested are only two of a great variety of possible methods of allocating distribution costs. They are presented merely as illustrations of defensible methods and not by any means as excluding other possible lines of

approach. What they suggest as to justifiable quantity differentials certainly does not give a conclusive answer to all the questions of sales policy involved.

Average Distribution Cost by Classes of Product

These cost calculations, for example, do not account for possible differences in the kinds of product making up the orders of various sizes. If all the product sold were of exactly the same character and priced basically in exactly the same way, a uniform schedule of quantity differentials might be entirely suitable. If, however, the line consists of a variety of products, some characteristically sold in small quantities at wide profit margins, and some in large quantities at narrow profit margins, it would be imperative to discover the relationship between the order size and product coverage before reaching any final conclusions.

Exhibit 7 presents an illustrative analysis of sales by products,

AVERAGE COST OF DISTRIBUTION BY CLASSES OF PRODUCT

(Figured for typical sales route for one week)

Product	Total Sales	No. Orders Containing Item	Av. Sale per Order Cont. Item	No. Orders Required to Sell 100 lb	Ratio to Average	Cost per Cwt.
A	847 lb	79	10.7 lb	9.35	3.42	$3.28
B	1,352	66	20.5	4.88	1.78	1.71
C	1,198	42	28.5	3.52	1.29	1.24
D	2,644	71	37.3	2.68	.98	.94
E	1,761	28	63.0	1.59	.58	.56
F	4,015	38	105.7	.95	.35	.34
Total	11,817 lb	324	36.5 lb	2.74	1.00	$ .96

EXHIBIT 7

showing for each of the six items in the line the total quantity sold, the number of orders containing the item, and the average quantity of the item called for by each order in which it appears. The third column of this exhibit indicates that the average order containing Product A calls for only 10.7 pounds of that product, while the average order for Product F calls for 105.7 pounds of that item. Thus the number of orders which must be taken to sell 100 pounds of Product A is nearly ten times as great as the number required to sell 100 pounds of Product F.

Assuming a uniform cost per order, the accountant may calculate the average cost per cwt. of selling each product. The assumed figures are given in the right-hand column of Exhibit 7.

The average distribution cost for all products is a little less than $1 per cwt. The individual products vary in distribution cost from $3.28 for Product A down to 34 cents for Product F.

If the selling prices of all these products carried the same margin over plant cost, Product F probably would be very profitable and Product A very unprofitable to sell. It usually happens, however, in cases like this that the gross profit margins attainable are governed pretty much by the cost of distribution. If the products in question are staple commodities, handled by a number of distributors, the prices will be forced into a pattern corresponding roughly with the selling and delivery cost. The reason for this is obvious. A distributor who tries to get a wide margin on Product F will find other distributors willing to buy the product from him (or elsewhere) in carload lots and sell it at a lower distributive price. Conversely, distributors whose business is exclusively or largely in Product A will have a selling and delivery cost which is so high that they will be compelled to obtain a wide margin to enable them to stay in business.

Prices Based on Quantities of Each Product in Typical Order

COMPARISON OF MARGINS ADJUSTED TO DISTRIBUTION COSTS ON TWO BASES

Product Basis				Order Basis			
Products	Total Sales	Distrib. Per Cwt.	Margin Total	Order Group	Total Sales	Distrib. Per Cwt.	Margin Total
A	847 lb	$5.00	$ 42.35	Under 25 lb ...	226 lb		
B	1,352	2.00	27.04	25-50 lb	991	$2.58(a)	$ 25.58
C	1,198	1.50	17.97	50-200 lb	3,768	1.75(b)	65.94
D	2,644	1.50	39.66	200-500 lb	3,025	1.25(c)	37.81
E	1,761	1.00	17.61	500-1,000 lb ...	2,515	1.00(d)	25.15
F	4,015	.50	20.08	Over 1,000 lb .	1,292	1.00(d)	12.29
Totals ..	11,817 lb	$1.39	$164.71	Totals	11,591 lb	$1.45	$167.40

(a) At base price plus service charge of 25 cents per order.
(b) At base price, set to provide margin of $1.75 per cwt.
(c) At discount of 50 cents per cwt. under base price.
(d) At discount of 75 cents per cwt. under base price.

EXHIBIT 8

The left-hand section of Exhibit 8 shows what the margins on these products might be expected to look like under typical conditions. The company's price list, in other words, may already provide the equivalent of quantity differentials, based not on the size of each individual order, but on the quantities of the various

products customarily sold in a typical order. The route has produced for the week a gross margin of $164.71 on the business done in this way.

If the management should decide at this point to adopt a plan of quantity discounts based on the size of the order (irrespective of the class of product sold) and should superimpose this scheme on its existing price structure, the results plainly would be disastrous. The quantity differentials, applied to the prices previously obtained, would result in narrowed gross margins, and thus in narrowed net profits. Obviously the basic prices would have to be revised before the quantity differential plan could be put into operation.

Revision of Basic Prices

This revision of basic prices might be quite complicated. It would not be sufficient simply to raise the entire price level by a uniform amount; the effect of this might be to put the price of Product A completely out of reach and yet leave the price of Product F where sales of that item in large quantities would be made at a loss

One alternative would be to reprice the entire line on a basis providing for a uniform gross profit margin for all items when sold in minimum quantities, and then to permit quantity differentials from the base price. To the extent that Product A continued to be sold in small quantities, the orders would earn no quantity differential. On the other hand, a product characteristically sold in large quantities might nominally earn the maximum differential and thus produce a gross margin not very different from the one realized previously.

In many cases, however, it may be found that a schedule of prices and differentials which reflects the full difference in cost between the very small and very large orders involves too wide a spread between the highest and lowest available prices, and is therefore undesirable from a practical standpoint. Some companies have met this situation by starting the differentials with orders of medium size, ignoring the high cost of the very small orders which are handled at a loss or as an accommodation. Others have refused to acept orders of less than a certain quantity, or have as-

sessed a service charge on such orders where the differential on a per pound basis would seem extreme.

On Illustrative Price Schedule

The right-hand section of Exhibit 8 shows what gross margin would have been earned if, without change in the size of the orders taken, the company had employed for the route in question the following schedule of prices and differentials: base price applicable to orders of less than 200 pounds, $1.75 over plant cost; differential for orders between 200 and 500 pounds, 50 cents under base price; differential for orders of over 500 pounds, 75 cents under base price; service charge for orders of less than 50 pounds, 25 cents per order; orders of less than 25 pounds declined. With no change in the distribution of the business by order-size groups, this schedule of prices and differentials would have produced approximately the same gross margin as the pricing plan illustrated in the left-hand section of Exhibit 8.

These figures again are illustrative, and probably do not represent the best possible solution of the pricing problem. In revising its schedule of prices and differentials, the company will naturally strive for a plan which will produce not the same but a greater gross and net profit margin. It might be possible to accomplish this not by reducing all basic prices to the same gross margin level, but by maintaining, if possible, the previously realized high margins on Products A and B, raising the basic margins on Products E and F, and then applying a schedule of quantity differentials.

Any plan of this kind would have to be worked out with extreme care to avoid the pitfalls of illegality on the one hand and unsound econmics on the other, but there is at least a chance of developing a more productive schedule by a careful fitting and trimming of the prices to take advantage of every profit possibility and distribution economy.

Problem A Continuing One

The problem is complicated by the fact that the pattern of product sales and order sizes will not necessarily remain uniform under a different schedule of prices. Penalties and incentives to customers for purchases in various quantities may lead to new buying

habits. Unfortunately, it is impossible to predict how the orders will be distributed under a new pricing and differential schedule until it has been tried, and it is very difficult to even estimate whether the cost differences under a new pricing plan will be the same as under the one previously followed.

The cost accountant, therefore, must be prepared to study the subject actively and continuously to help the management avoid unintentional price discriminations which might be held in violation of the law. At the same time the sales manager must follow closely the effect of his pricing policies to determine whether they are productive of the kind and amount of business which is necessary to the wholesome operation of the enterprise.

Thus the problem is a continuous one, not to be solved simply and finally by a single analysis. It calls for the most thoughtful and penetrating study by cost accountants and sales managers alike. If the work is done thoroughly and intelligently it should pave the way for sounder and more profitable pricing policies.

BIBLIOGRAPHY

APPLICATION OF DISTRIBUTION COSTS

N. A. C. A. Publications:

Accounting for the Robinson-Patman Act. Willard L. Thorp. 1937 Year Book, pp. 6-27.

Allocation of Distribution Expenses to Classes of Products by Use of Standard Rates. J. Ross Smith. Sec. I, September 1, 1933. (out of print)

Cost Accounting Opportunities Under the Robinson-Patman Act. Albert E. Sawyer. Sec. I, February 15, 1937.

Cost Factors in the Determination of Price Discrimination. W. H. S. Stevens. Sec. I, February 15, 1937.

Defenses Under the Robinson-Patman Act, with Special Reference to Cost Defenses. A. S. Aronson. 1937 Year Book, pp. 27-50.

Development of Standards for the Control of Selling Activities. Howard C. Greer. Sec. I, March 15, 1932.

General:

How to Price Goods Under the Robinson-Patman Act. A. Harding. Sales Management, 420 Lexington Ave., New York, N. Y. October 1, 1936

Merchandising Under the Robinson-Patman Act. G. H. Montague. Advertising and Selling, 9 E. 38th St., New York, N. Y. October 8, 1936.

Sales Cost Under the Robinson-Patman Law; figures to show how much less it cost Bird & Son to sell Montgomery Ward & Co. than other retailers. Business Week, 330 W. 42nd St., New York, N. Y. September 4, 1937.

Suggested Bases for the Distribution of Estimated and Actual Selling Expenses to Sales Departments and Territories. Sales Management, 420 Lexington Ave., New York, N. Y. August 1, 1937.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933

Of N. A. C. A. Bulletin, published semi-monthly at New York, N. Y., for Oct. 1, 1937. State of New York, County of New York, ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared R. P. Marple, who having been duly sworn according to law, deposes and says that he is the Editor of the N. A. C. A. Bulletin and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in Section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, National Association of Cost Accountants, 385 Madison Ave., New York, N. Y. Editor, R. P. Marple, 385 Madison Ave., New York, N. Y. Managing Editor, none. Business Manager, S. C. McLeod, 385 Madison Ave., New York, N. Y.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) National Association of Cost Accountants, 385 Madison Ave., New York, N. Y. President, William F. Marsh, Lybrand, Ross Bros. & Montgomery, Union Bank Bldg., Pittsburgh, Pa. Secretary, S. C. McLeod, 385 Madison Ave., New York, N. Y. Treasurer, P. J. Warner, The Ronald Press Co., 15 E. 26th St., New York, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed through the mails or otherwise, to paid subscribers during the twelve months preceding the date shown above is.....(This information is required from daily publications only.)

R. P. MARPLE,
Editor.

Sworn to and subscribed before me this 7th day of October, 1937.

(Seal) GEORGE A. CAMPBELL,
Notary Public,

King's Co. Clerk's No. 176, Reg. No. 8193.
New York Co. Clerk's No. 490, Reg. No. 8C256.
Term expires March 30, 1938.